

# **Mass Avenue/Worthen Road Preliminary Intersection Concept Plans**



# Background

- October 7, 2014 - Transportation Safety Group (TSG) reviewed a request to address safety conditions in this area. TSG agreed that a recommendation be made to the BOS to conduct a traffic study that would address concerns and improve safety and operations.
- November 3, 2014 – Town Manager notified the BOS of TSG's recommendation.
- January 2015 – DPW Engineering began process of procuring traffic consultant
- May, 2015 – Traffic Consultant began analysis and developing concepts

# Development of Concepts

- Two Signalized Concepts
- Four Roundabout Concepts
- Attempts were made to limit the right-of-way impacts
- Relocation of existing overhead utility lines was not evaluated
- Proposed Public Right-Of-Way Access Guidelines (PROWAG) published by the ADA/AAB requires the use of pedestrian activated signals (signals or HAWK) on all roundabout approaches and departures that feature more than one travel lane

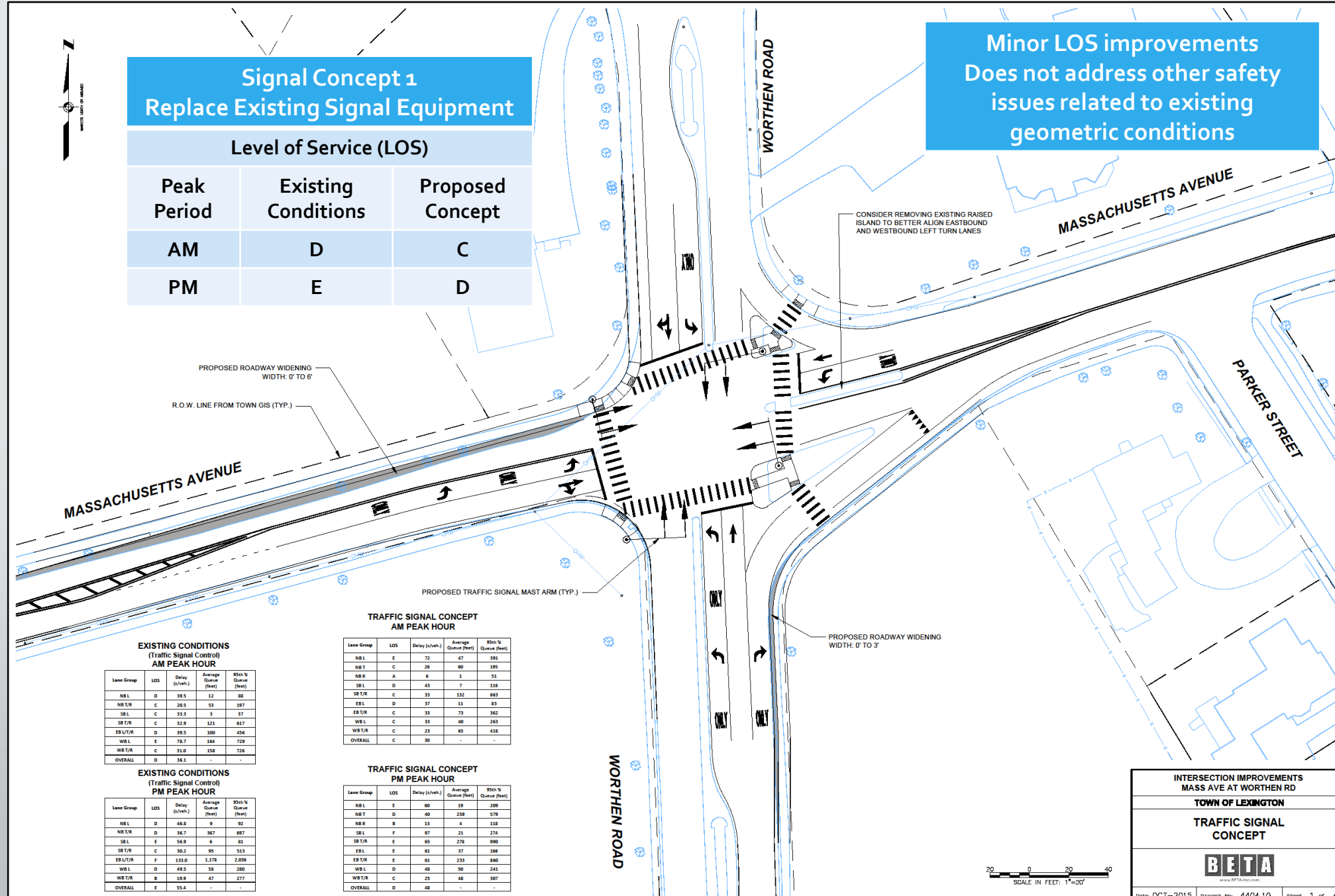


## Signal Concept 1 Replace Existing Signal Equipment

### Level of Service (LOS)

Peak Period	Existing Conditions	Proposed Concept
AM	D	C
PM	E	D

Minor LOS improvements  
Does not address other safety  
issues related to existing  
geometric conditions



EXISTING CONDITIONS  
(Traffic Signal Control)  
AM PEAK HOUR

Lane Group	LOS	Delay (s/veh.)	Average Queue (feet)	95th % Queue (feet)
NB L	D	39.5	12	88
NB T/R	C	20.5	53	197
SB L	C	33.3	3	37
SB T/R	C	32.9	121	617
EB T/R	D	39.5	100	456
WB L	E	73.7	144	719
WB T/R	C	31.0	158	726
OVERALL	D	36.1	-	-

EXISTING CONDITIONS  
(Traffic Signal Control)  
PM PEAK HOUR

Lane Group	LOS	Delay (s/veh.)	Average Queue (feet)	95th % Queue (feet)
NB L	D	46.8	9	92
NB T/R	D	36.7	367	697
SB L	E	56.9	6	81
SB T/R	C	30.2	95	513
EB T/R	F	135.0	1,178	2,036
WB L	D	45.5	36	266
WB T/R	B	19.9	47	272
OVERALL	E	53.4	-	-

TRAFFIC SIGNAL CONCEPT  
AM PEAK HOUR

Lane Group	LOS	Delay (s/veh.)	Average Queue (feet)	95th % Queue (feet)
NB L	E	72	47	391
NB T	C	26	60	195
NB R	A	6	1	51
SB L	D	43	7	116
SB T/R	C	35	152	663
EB L	D	37	11	83
EB T/R	C	33	73	362
WB L	C	33	40	243
WB T/R	C	23	65	418
OVERALL	C	30	-	-

TRAFFIC SIGNAL CONCEPT  
PM PEAK HOUR

Lane Group	LOS	Delay (s/veh.)	Average Queue (feet)	95th % Queue (feet)
NB L	E	80	59	209
NB T	D	40	239	579
NB R	B	13	4	118
SB L	F	97	21	274
SB T/R	E	85	278	990
EB L	E	61	37	166
EB T/R	E	61	235	860
WB L	D	48	50	241
WB T/R	C	25	48	307
OVERALL	D	48	-	-

INTERSECTION IMPROVEMENTS  
MASS AVE AT WORTHEN RD

TOWN OF LEXINGTON

TRAFFIC SIGNAL  
CONCEPT

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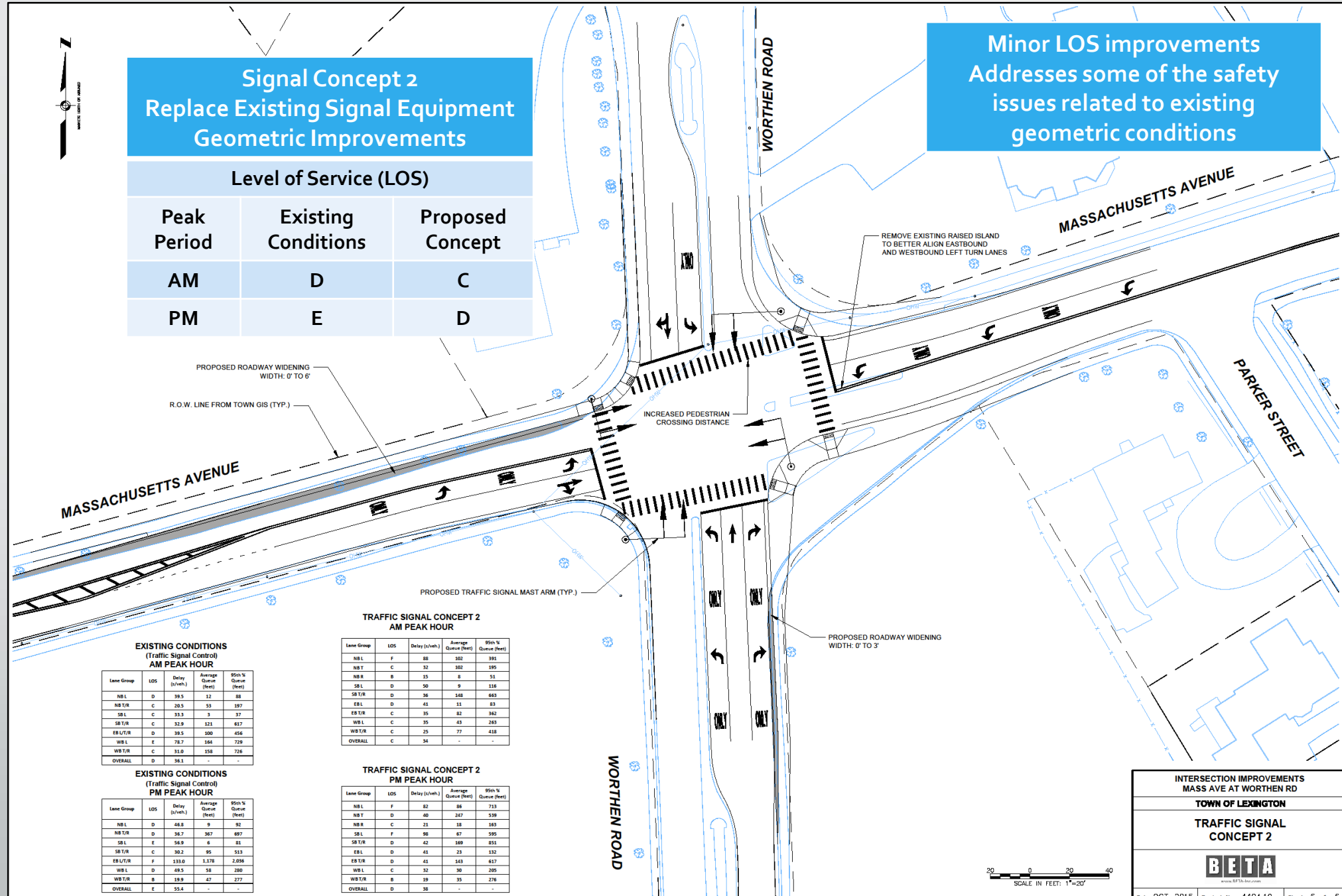


## Signal Concept 2 Replace Existing Signal Equipment Geometric Improvements

### Level of Service (LOS)

Peak Period	Existing Conditions	Proposed Concept
AM	D	C
PM	E	D

Minor LOS improvements  
Addresses some of the safety  
issues related to existing  
geometric conditions



#### EXISTING CONDITIONS (Traffic Signal Control) AM PEAK HOUR

Lane Group	LOS	Delay (s/veh.)	Average Queue (feet)	95th % Queue (feet)
NB L	D	39.5	12	88
NB T/R	C	20.5	53	197
SB L	C	33.3	3	37
SB T/R	C	32.9	121	437
EB L/T/R	D	38.5	300	456
WB L	E	78.7	366	728
WB T/R	C	31.0	358	728
OVERALL	D	36.1	-	-

#### EXISTING CONDITIONS (Traffic Signal Control) PM PEAK HOUR

Lane Group	LOS	Delay (s/veh.)	Average Queue (feet)	95th % Queue (feet)
NB L	D	46.8	9	92
NB T/R	D	36.7	367	697
SB L	E	56.9	6	81
SB T/R	C	30.2	95	513
EB L/T/R	F	139.0	1,178	2,036
WB L	D	49.5	58	280
WB T/R	B	19.9	47	277
OVERALL	E	55.4	-	-

#### TRAFFIC SIGNAL CONCEPT 2 AM PEAK HOUR

Lane Group	LOS	Delay (s/veh.)	Average Queue (feet)	95th % Queue (feet)
NB L	F	88	382	392
NB T	C	32	382	395
NB R	B	35	8	51
SB L	D	50	9	116
SB T/R	D	36	348	663
EB L	D	41	11	83
EB T/R	C	35	82	362
WB L	C	35	48	268
WB T/R	C	25	77	418
OVERALL	C	34	-	-

#### TRAFFIC SIGNAL CONCEPT 2 PM PEAK HOUR

Lane Group	LOS	Delay (s/veh.)	Average Queue (feet)	95th % Queue (feet)
NB L	F	82	86	733
NB T	D	40	247	539
NB R	C	21	18	163
SB L	F	96	87	595
SB T/R	D	42	189	851
EB L	D	41	23	132
EB T/R	D	41	143	617
WB L	C	32	39	205
WB T/R	B	19	35	276
OVERALL	D	38	-	-

INTERSECTION IMPROVEMENTS  
MASS AVE AT WORTHEN RD

TOWN OF LEXINGTON

TRAFFIC SIGNAL  
CONCEPT 2





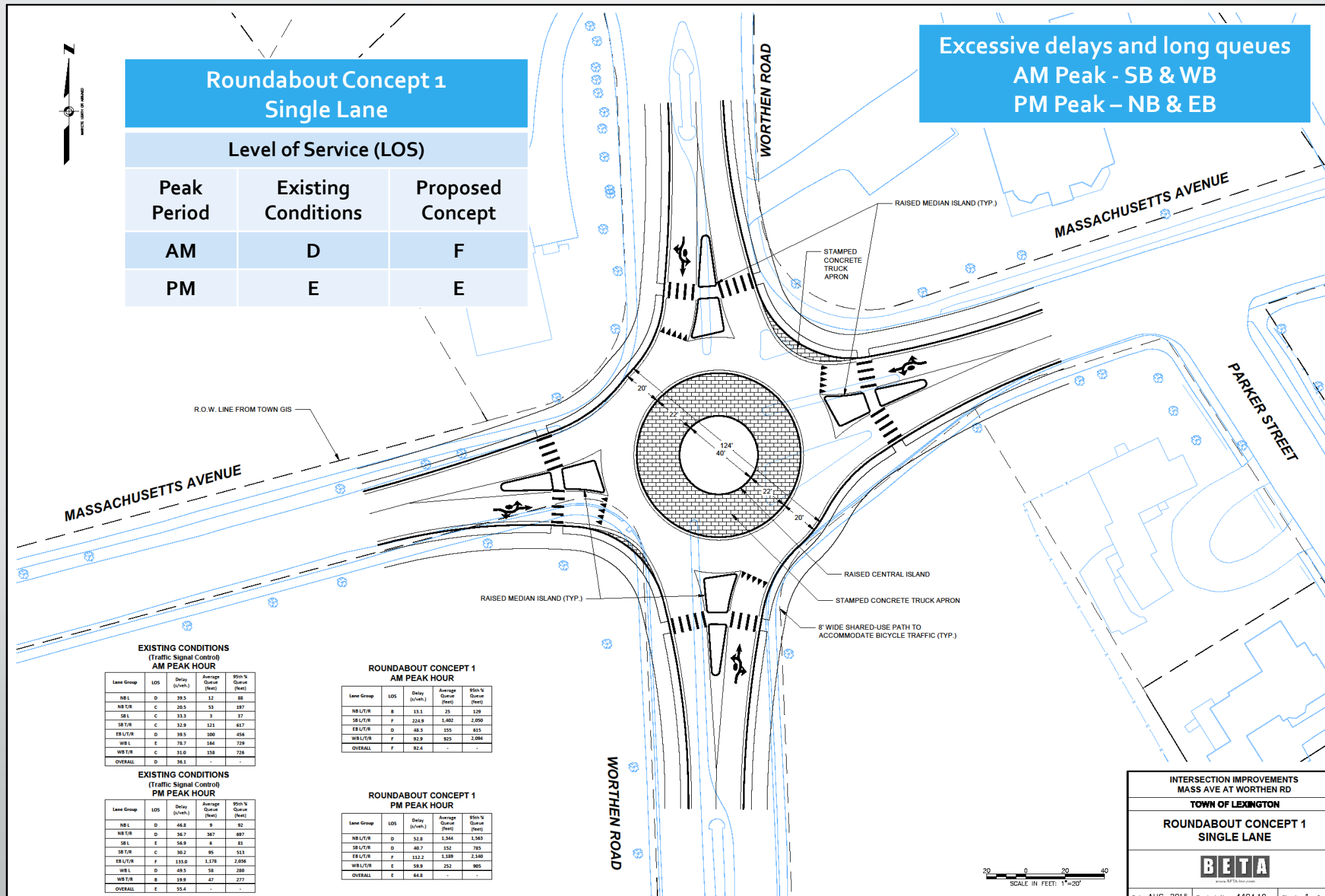


## Roundabout Concept 1 Single Lane

### Level of Service (LOS)

Peak Period	Existing Conditions	Proposed Concept
AM	D	F
PM	E	E

Excessive delays and long queues  
AM Peak - SB & WB  
PM Peak - NB & EB



EXISTING CONDITIONS  
(Traffic Signal Control)  
AM PEAK HOUR

Lane Group	LOS	Delay (s/veh.)	Average Queue (feet)	95th % Queue (feet)
NB L	D	38.5	12	86
NB T/R	C	20.5	53	197
SB L	C	33.3	3	37
SB T/R	C	32.8	121	617
EB L/T/R	D	99.5	100	456
WB L	E	78.7	184	729
WB T/R	C	31.0	158	726
OVERALL	D	56.1	-	-

EXISTING CONDITIONS  
(Traffic Signal Control)  
PM PEAK HOUR

Lane Group	LOS	Delay (s/veh.)	Average Queue (feet)	95th % Queue (feet)
NB L	D	45.8	9	52
NB T/R	D	36.7	367	697
SB L	E	56.9	6	81
SB T/R	C	30.2	95	513
EB L/T/R	F	133.0	1,178	2,636
WB L	D	49.5	58	280
WB T/R	B	19.9	47	277
OVERALL	E	55.4	-	-

ROUNDABOUT CONCEPT 1  
AM PEAK HOUR

Lane Group	LOS	Delay (s/veh.)	Average Queue (feet)	95th % Queue (feet)
NB L/T/R	B	13.1	25	128
SB L/T/R	F	224.9	1,482	2,959
EB L/T/R	D	48.3	159	615
WB L/T/R	F	92.9	925	2,094
OVERALL	F	92.4	-	-

ROUNDABOUT CONCEPT 1  
PM PEAK HOUR

Lane Group	LOS	Delay (s/veh.)	Average Queue (feet)	95th % Queue (feet)
NB L/T/R	D	52.8	1,344	1,563
SB L/T/R	D	40.7	152	785
EB L/T/R	F	112.2	1,189	2,140
WB L/T/R	E	58.9	252	905
OVERALL	E	64.8	-	-

20 0 20 40  
SCALE IN FEET: 1"=20'

INTERSECTION IMPROVEMENTS  
MASS AVE AT WORTHEN RD

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ROUNDABOUT CONCEPT 1  
SINGLE LANE

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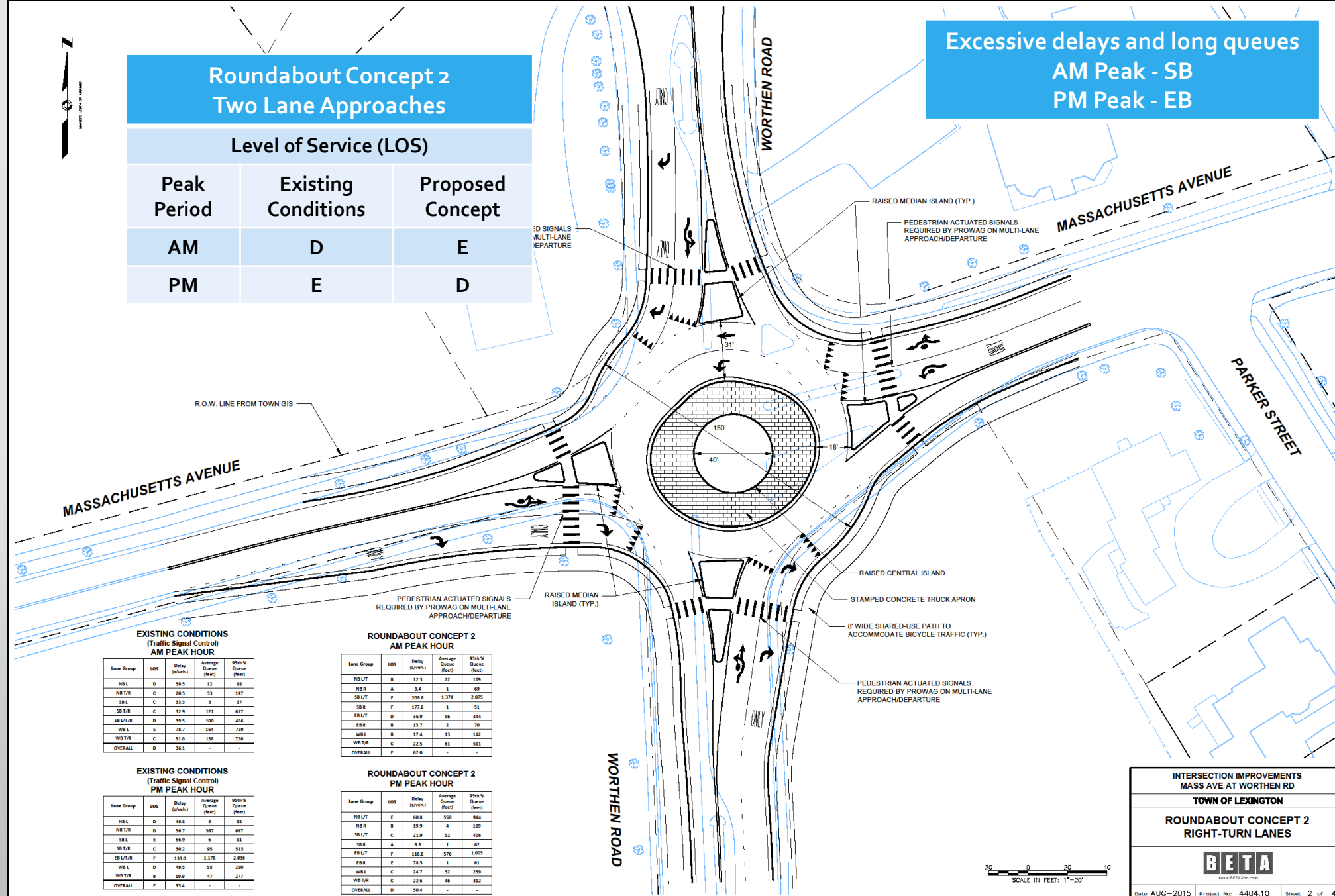


## Roundabout Concept 2 Two Lane Approaches

### Level of Service (LOS)

Peak Period	Existing Conditions	Proposed Concept
AM	D	E
PM	E	D

Excessive delays and long queues  
AM Peak - SB  
PM Peak - EB



EXISTING CONDITIONS  
(Traffic Signal Control)  
AM PEAK HOUR

Lane Group	LOS	Delay (s/veh.)	Average Queue (feet)	95th % Queue (feet)
NB L	D	38.5	32	88
NB T/R	C	20.5	53	187
SB L	C	33.3	3	37
SB T/R	C	32.9	121	617
EB L/T/R	D	38.5	100	456
WB L	E	78.7	166	729
WB T/R	C	33.0	158	726
OVERALL	D	38.1	-	-

EXISTING CONDITIONS  
(Traffic Signal Control)  
PM PEAK HOUR

Lane Group	LOS	Delay (s/veh.)	Average Queue (feet)	95th % Queue (feet)
NB L	D	46.8	9	92
NB T/R	D	36.7	367	697
SB L	E	56.9	6	81
SB T/R	C	30.2	95	515
EB L/T/R	F	153.0	1,178	2,058
WB L	D	49.5	36	286
WB T/R	B	19.9	47	277
OVERALL	E	55.4	-	-

ROUNDBOUT CONCEPT 2  
AM PEAK HOUR

Lane Group	LOS	Delay (s/veh.)	Average Queue (feet)	95th % Queue (feet)
NB L/T	B	12.3	22	109
NB R	A	5.4	1	69
SB L/T	F	209.8	1,374	2,405
SB R	F	177.8	1	51
EB L/T	D	36.9	96	464
EB R	B	13.7	2	70
WB L	B	17.4	13	142
WB T/R	C	22.5	61	511
OVERALL	E	62.0	-	-

ROUNDBOUT CONCEPT 2  
PM PEAK HOUR

Lane Group	LOS	Delay (s/veh.)	Average Queue (feet)	95th % Queue (feet)
NB L/T	E	60.8	550	844
NB R	B	19.9	4	109
SB L/T	C	11.9	52	406
SB R	A	9.8	1	62
EB L/T	F	116.0	576	1,003
EB R	E	78.5	1	61
WB L	C	24.7	32	259
WB T/R	C	22.8	46	352
OVERALL	D	58.4	-	-

INTERSECTION IMPROVEMENTS  
MASS AVE AT WORTHEN RD

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ROUNDBOUT CONCEPT 2  
RIGHT-TURN LANES

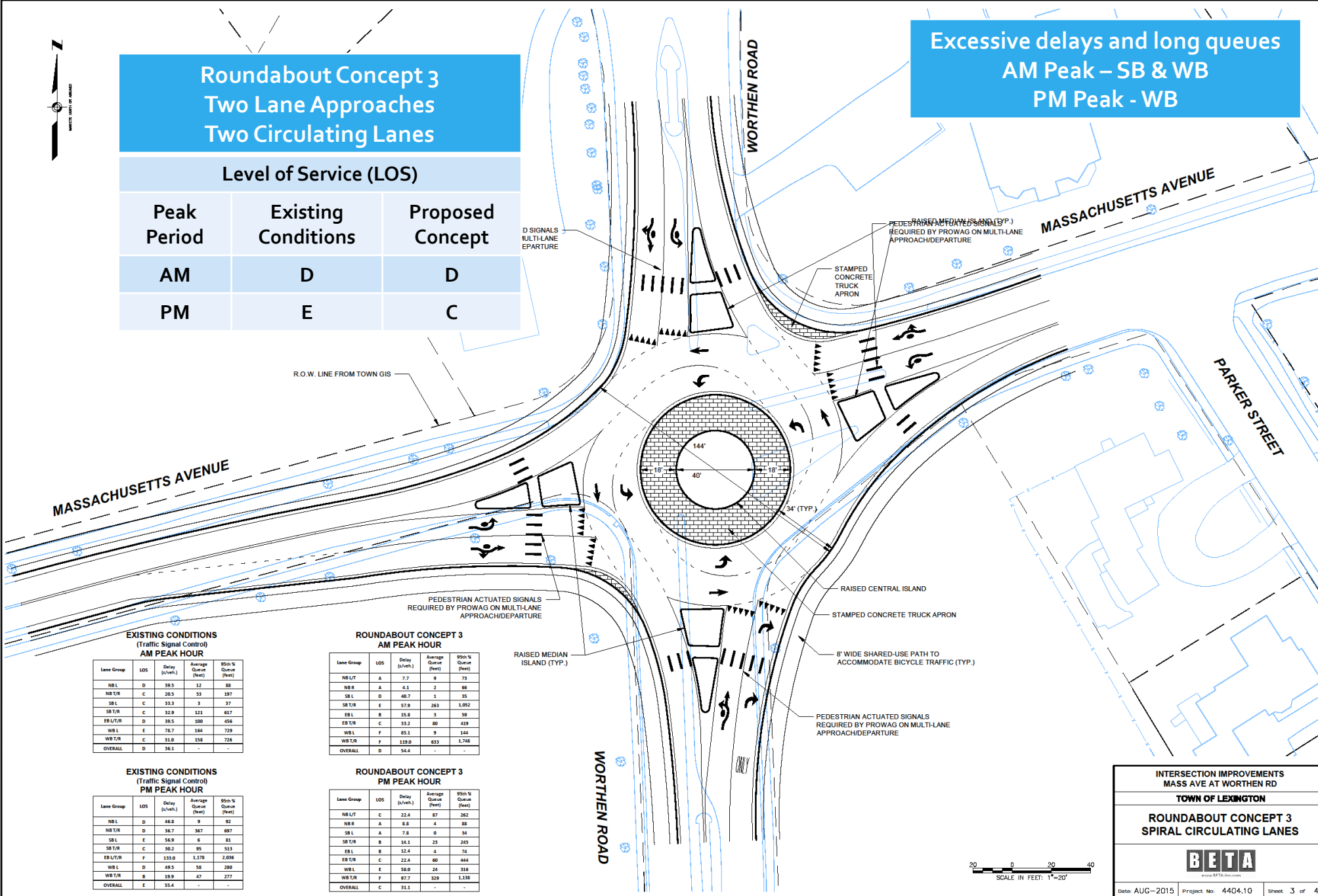




# Roundabout Concept 3 Two Lane Approaches Two Circulating Lanes

Level of Service (LOS)		
Peak Period	Existing Conditions	Proposed Concept
AM	D	D
PM	E	C

Excessive delays and long queues  
AM Peak – SB & WB  
PM Peak - WB



**EXISTING CONDITIONS**  
(Traffic Signal Control)  
**AM PEAK HOUR**

Lane Group	LOS	Delay (s/veh.)	Average Queue (feet)	95th % Queue (feet)
NB L	D	99.5	32	88
NB T/R	C	20.5	53	197
SB L	C	33.3	5	37
SB T/R	C	32.9	121	417
EB L/T/R	D	39.5	100	454
WB L	E	78.7	184	729
WB T/R	C	31.0	158	728
OVERALL	D	54.1	-	-

**EXISTING CONDITIONS**  
(Traffic Signal Control)  
**PM PEAK HOUR**

Lane Group	LOS	Delay (s/veh.)	Average Queue (feet)	95th % Queue (feet)
NB L	D	46.8	9	92
NB T/R	D	36.7	367	697
SB L	E	56.9	6	51
SB T/R	C	30.2	95	315
EB L/T/R	F	133.0	1,170	2,036
WB L	D	49.5	58	280
WB T/R	B	19.9	47	277
OVERALL	E	55.4	-	-

**ROUNDABOUT CONCEPT 3**  
**AM PEAK HOUR**

Lane Group	LOS	Delay (s/veh.)	Average Queue (feet)	95th % Queue (feet)
NB L/T	A	7.7	9	73
NB R	A	4.1	2	66
SB L	D	40.7	1	35
SB T/R	E	57.9	263	1,052
EB L	B	15.8	3	59
EB T/R	C	15.2	80	419
WB L	F	85.1	9	144
WB T/R	F	119.0	633	1,748
OVERALL	D	54.4	-	-

**ROUNDABOUT CONCEPT 3**  
**PM PEAK HOUR**

Lane Group	LOS	Delay (s/veh.)	Average Queue (feet)	95th % Queue (feet)
NB L/T	C	22.4	87	262
NB R	A	8.8	4	88
SB L	A	7.8	0	34
SB T/R	B	14.1	23	245
EB L	B	12.4	4	74
EB T/R	C	22.4	80	444
WB L	E	18.0	24	315
WB T/R	F	87.7	329	1,138
OVERALL	C	31.1	-	-



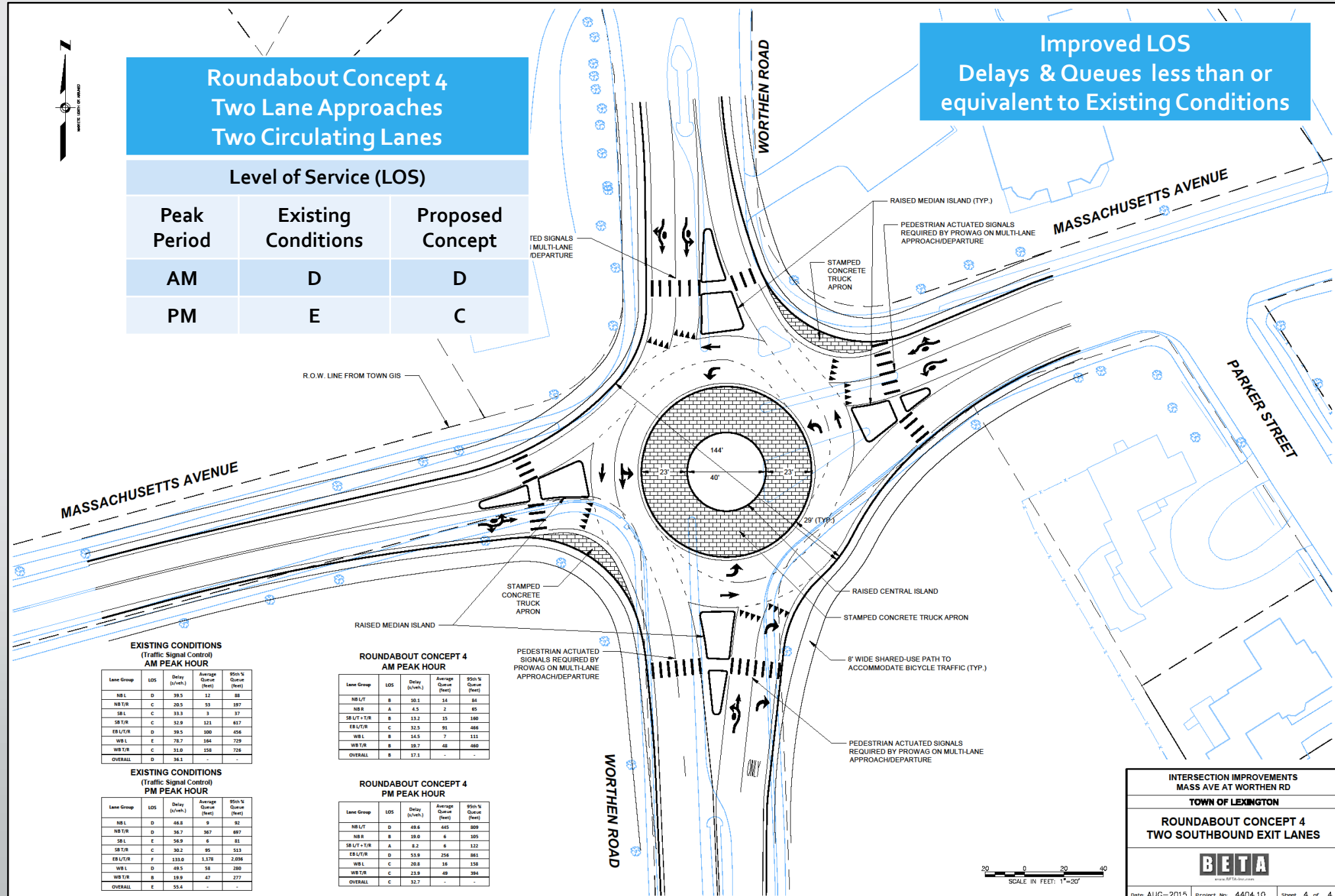


## Roundabout Concept 4 Two Lane Approaches Two Circulating Lanes

### Level of Service (LOS)

Peak Period	Existing Conditions	Proposed Concept
AM	D	D
PM	E	C

Improved LOS  
Delays & Queues less than or  
equivalent to Existing Conditions



#### EXISTING CONDITIONS (Traffic Signal Control) AM PEAK HOUR

Lane Group	LOS	Delay (s/veh.)	Average Queue (feet)	95th % Queue (feet)
NB L	D	39.5	12	32
NB T/R	C	20.5	53	187
SB L	C	33.3	3	37
SB T/R	C	32.9	123	617
EB L/T/R	D	98.5	100	456
WB L	E	78.7	164	729
WB T/R	C	51.0	158	726
OVERALL	D	56.1	-	-

#### EXISTING CONDITIONS (Traffic Signal Control) PM PEAK HOUR

Lane Group	LOS	Delay (s/veh.)	Average Queue (feet)	95th % Queue (feet)
NB L	D	46.8	9	92
NB T/R	D	56.7	367	697
SB L	E	56.9	6	81
SB T/R	C	30.2	95	513
EB L/T/R	F	133.0	1,178	2,036
WB L	D	49.5	58	280
WB T/R	B	18.9	47	277
OVERALL	E	55.4	-	-

#### ROUNDABOUT CONCEPT 4 AM PEAK HOUR

Lane Group	LOS	Delay (s/veh.)	Average Queue (feet)	95th % Queue (feet)
NB L/T	B	10.1	14	54
NB R	A	4.5	2	65
SB L/T + T/R	B	13.2	35	180
EB L/T/R	C	12.8	91	486
WB L	B	14.5	7	111
WB T/R	B	19.7	48	480
OVERALL	B	17.1	-	-

#### ROUNDABOUT CONCEPT 4 PM PEAK HOUR

Lane Group	LOS	Delay (s/veh.)	Average Queue (feet)	95th % Queue (feet)
NB L/T	D	69.6	445	909
NB R	B	19.0	6	105
SB L/T + T/R	A	8.2	6	122
EB L/T/R	D	33.9	258	881
WB L	C	10.8	16	138
WB T/R	C	23.9	49	394
OVERALL	C	32.7	-	-

INTERSECTION IMPROVEMENTS  
MASS AVE AT WORTHEN RD

TOWN OF LEXINGTON

ROUNDABOUT CONCEPT 4  
TWO SOUTHBOUND EXIT LANES



# Next Steps

- Collect public feedback
- Continue further development of concepts

